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one particular direction, however the actual direction might be changed; the experiments on ability to recognize the distance of a sound, which seemed to show that it did not depend to any great extent on the loudness; also those on the simultaneous recognition of the direction of two sounds or a sound and a noise; the author's criticism of the Lotze theory of local signs for vision and the similar theory of Münsterberg for auditory localization. Von Kries concludes somewhat as follows. Two things appear from these experiments, in spite of their relatively small number: First, an approximately certain median location is possible under some circumstances (at least in case of discriminating before and behind), even when the sounds used change irregularly from experiment to experiment in intensity, quality, and distance; second, that under other circumstances the location is remarkably uncertain. [To the reviewer it seems regrettable that von Kries did not experiment with the experimentee's head fixed, (he was only instructed to keep it still); for certainly in the case of sounds which last an appreciable length of time a very slight, and possibly unconscious, motion of the head might be expected to be an immense aid in deciding between before and behind.]

E. C. S.

Zur interauralen Lokalisation diotischer Wahrnehmungen. KARL L. SCHAEFER. *Zeitschrift für Psychologie*, Bd. I (1890), H. 4—5, S. 300.

Equal intensity of sound in the two ears regularly gives median location, but intercranial location only under certain circumstances. Sylvanus Thompson observed that when a telephone is held against each ear a single intercranially located sound is heard, provided that the diaphragms of the two telephones vibrate at the same rate, with the same amplitude and in contrary directions, *i. e.* both at the same time toward the head or both away from it. When the last condition is not fulfilled the sound is double and located in both ears. The explanation of this is briefly as follows: Sounds are located on the side on which they are most intensely heard; if the intensity alternates slowly, they seem to shift from ear to ear; if the shifting is very rapid they may appear to be located in both ears; such an alternation of intensity and quality is given by the telephone diaphragms on their inward and outward swings. Intercranial location, as opposed to extracranial, seems to depend on the estimated nearness of the individual sounds (a stimulus to a single ear never produces it), and this in turn seems influenced by intensity. If the single sounds are located away from the ears, the location of the combined sound is extracranial; if in the ears, intercranial. For the simple and interesting experiments which support these conclusions the original should be consulted.

Urtheiläuschungen nach Beseitigung einseitiger Harthörigkeit. W. VON BEZOLD. *Zeitschrift für Psychologie*. Bd. I, 1890, H. 6, S. 486-487.

Von Bezold relates the following interesting experience of his student days. At that time he suffered for a considerable time from extreme deafness in the left ear, which later proved to be due to a wad of cotton which had been driven in against the ear-drum and there become fixed. When this was removed, the resulting illusions were of striking intensity. Turning the leaves of a book under such circumstances "produces a noise that can only be compared to that of a powerful waterfall, and would rise to pain, if the sensation were not diminished by stopping the ear with cotton." Still more important were the illusions of localization due to the disproportionate sensitiveness of the left ear. Sounds were localized always too far to the left, and sometimes, even when they came from the right, were referred to that side. This illusion was so disturbing as to give considerable discomfort in crossing

streets and open places. It was three weeks before the true localization of things was tolerably re-learned, and six before errors disappeared.

Eine Methode zur Beobachtung des Simultancontrastes. E. HERING. Pfüger's Archiv, Bd. XLVII, H. 4—5, 1890.

In this paper Hering describes a new method of performing his characteristic experiment for demonstrating the physiological nature of simultaneous contrast. Two sheets of even-surfaced colored paper, say blue and yellow, of complementary color-tone, are laid close together with their line of junction perpendicular to the median plane of the head. Two narrow strips of the same papers are laid at right-angles to the line of junction, but not reaching quite to it, one above the other, the blue on the yellow and the yellow on the blue. The whole is now looked at through an acromatic double refracting prism in such a way as to double the images of the strips, but not the line of junction. Each of these double images physically represents a mixture of the complementary colors of the strip and the ground, and might be expected to look gray. As a matter of fact however, each is seen distinctly in its own color, in other words, the color complementary to the general field in which it lies. The effect is said to be very striking. In this form the experiment is not free of successive contrast, but is easily made so by furnishing the eye with a fixation point and keeping the colored fields covered till the instant when the observation is to be made. White paper may also be introduced about the color fields and the phenomenon thus be demonstrated not to be due to a changed notion of what white really is. Helmholtz has regarded it as important that the strips should seem to be a part of the general colored field in which they lie, but the modifications of this experiment, especially the binocular form of it, show that to be quite unessential. These experiments and others like them which Hering has devised should leave the "psychological" explanation of simultaneous contrast without a supporter. An instrument designed by Hering for these experiments is made by R. Rothe, Universitäts Mechaniker, deutsch. physiol. Institut, Prag.

Zur Theorie des Farbensinnes bei indirektem Sehen. A. FICK. Archiv f. d. ges. Physiol., Bd. XLVII (1890), H. 6-7-8, S. 274-285.

The points urged by Hering in the critique to which Fick here replies (see review, AMER. JOUR. PSYCHOL. III, 204), were partly dialectic and partly experimental. The first Fick seems to have little difficulty in turning, and in the second he even finds support for his own position. That a certain red and green (or rather blue-green) on moving toward the retinal periphery should lose in saturation and finally become white without changing in color-tone (Hering's central fact), he shows to be not only explained, but required by his own theory.

Ueber die Tonänderungen der Spectralfarben durch Ermüdung der Netzhaut mit homogenem Lichte. Dr. CARL HESS. Archiv für Ophthalmologie. Bd. XXXVI, 1890, H. 1, S. 1-32.

In this study, as in that upon the color sensations of the peripheral portions of the retina (Review, AMER. JOUR. PSYCH., Vol. III, p. 208), Hess subjects a set of facts, already long known, to a careful re-investigation, and brings from his more accurate results consequences of importance. When the eye has been fatigued by gazing some seconds at one color, other colors upon which it is turned do not appear as to the unfatigued eye, but are changed in a certain fixed and definite manner. What these changes are when the colors are homogeneous spectral lights (and purples mixed from spectral red and violet), and when the other conditions of the experiment are accurately fixed, was Hess's problem. The apparatus used was designed by Hering in whose